

Elan PMU Evaluation Utility

Version 1.0

The Élan PMU Evaluation Utility is a DOS utility designed to demonstrate the power management capabilities of the Élan chip. This utility will run on the Élan evaluation board, Revision 2.2 or later. By using a current meter attached to Elan's various voltage plains, the user can see how different PMU setups affect power consumption. It is recommended that the user read through the Elan Programmers Reference Manual to gain an understanding Elan's power management functions.

Main Menu

From the DOS prompt type "elanpmu" to bring up the main menu.

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- A: Setup PMU Mode Characteristics (PMCx Pins, CPU Speed)
- B: Force PMU State Transitions
- C: Test Battery Level & ACIN Pins
- D: Test State Transition Timers & Suspend/Resume Key

- X: Restore PMU State and Exit to DOS
- Z: Leave current PMU values and Exit to DOS

Enter Selection => /

The spinning cursor "/" is used to emulate typical CPU activity. This activity will give a lower current reading for core Elan current than if the processor was sitting idle waiting for keyboard input. This is because cycles to the ISA devices (which occur as a result of this activity) are run at 9.2mhz. CPU idle cycles occur at the High Speed PLL mode frequency (33/25/20/9.2Mhz).

A: Setup PMU Mode Characteristics (PMCx Pins, CPU Speed)

This menu selection will bring up a matrix of options that can be set for each PMU mode. The value of the highlighted matrix item can be changed by pressing the "+" or "-" keys on the keyboard. The arrow keys will control which item is highlighted. Matrix items with a "*" after them are fixed in Elan and cannot be highlighted or changed. Matrix items with a "#" after them are fixed at there current state due to an requirement of the evaluation board. These items cannot be highlighted or changed.

Changes made to this screen will not take affect until either the "S" key is pressed (Program Elan), or the "X" key is pressed (Program Elan & Return to Main Menu). To exit this screen without programming Elan with any changes, press the "Q" key. To restore the values to those currently programmed in Elan, press the "L" key.

While in this screen, the CPU is running in High Speed PLL Mode. When any changes to the High Speed PLL Mode column are saved, the results will be immediately noticeable. (EX. The affect CPU Speed has on core current). Changes to other columns on the screen will not be noticeable until those PMU modes are entered.

The state of the PMC pins can be set for each PMU mode. While the particular state the PMC pin is in will not significantly affect Elan's power consumption, this matrix allows the user to see the type of control the user has to externally control the PMC pins for each PMU mode. Note that the PMC pin setting for Low and High Speed PLL modes mirror each other. Changing the value in one column will cause the value in the other column to also change.

High Speed PLL Mode Column:

- The CPU speed can be set to 33Mhz, 25Mhz, 20Mhz, or 9.2Mhz.
- Both the High Speed and Low Speed PLL's for this mode are enabled.
- The state of the PMC pins for this mode mirror the settings in Low Speed PLL mode. Changing the state in this mode will also change the state for Low Speed PLL mode.
- Auto Low Speed mode, when enabled, will switch the CPU clock speed to operate at 9.2Mhz for the duration of time listed in ALS Duration matrix item (0.25, 0.50, 1.0, 2.0 seconds). This switch will be triggered at a rate determined by the ALS Trigger matrix item with can be set to 4, 8, 16, or 32 seconds. The ALS trigger period and ALS Duration time are stored in write only registers. Therefore it is not possible to read the current Elan programmed value when this utility is started. The default values of 4 seconds for the ALS Trigger and 0.25 seconds for the ALS Duration are programmed at startup time.
- The CPU Idle Speed can be set to "HIGH" or "LOW". "HIGH" means the current High Speed CPU speed (33/25/20/9.2), "LOW" means 9.2Mhz. The CPU Idle Speed can only be set "LOW" if the High Speed CPU speed is set to 20Mhz or 9.2Mhz. If the CPU speed is set to 33Mhz or 25Mhz and the CPU Idle Speed is then set to "LOW", the CPU speed will change to 20Mhz. Similarly if the CPU Idle Speed is set to "LOW" and the CPU speed is changed to 33Mhz or 25Mhz, the CPU Idle speed will be changed to "HIGH".

Low Speed PLL Mode Column:

- The CPU speed can be set to 4.61Mhz, 2.30Mhz, 1.15Mhz, or 0.58Mhz.
- The High Speed PLL can be enabled or disabled in this mode.
- The Low Speed PLL is always enabled for this mode.
- The state of the PMC pins for this mode mirror the settings in High Speed PLL mode. Changing the state in this mode will also change the state for High Speed PLL mode.

Doze Mode Column:

- The CPU for this mode can be turned "OFF", or it can be enabled to run at 9.2Mhz in response to IRQ0 being generated. "IRQ0-9.2Mhz" will appear as the matrix item. For this mode the CPU will only run at 9.2Mhz during time IRQ0 is being processed. Setting this matrix item to "IRQ0+64 R" will enable the CPU to run at 9.2Mhz while processing IRQ0 and the CPU will remain running for 64 refresh cycles after IRQ0 processing is completed.
- The High speed PLL is always disabled for this mode.
- The Low speed PLL and Video PLL (They are controlled by the same bit). can be enabled or disabled for this mode. If these PLL's are disable and you are using Elan's LCD controller, the LCD screen will go blank.

Sleep Mode Column:

- The CPU is always off in this mode.
- The High Speed PLL is always off in this mode.
- The Low speed PLL and Video PLL (They are controlled by the same bit). can be enabled or disabled for this mode.

Suspend & Off Mode Column:

- The CPU is always off in these modes.
- The High Speed PLL is always off in these modes.
- The Low speed PLL and Video PLL (They are controlled by the same bit). can be enabled or disabled for these modes.

B: Force PMU State Transitions

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Force PMU Modes

A: Force PMU to Low Speed PLL Mode xxxMHz
B: Force PMU to Doze Mode
C: Force PMU to Sleep Mode
D: Force PMU to SUSPEND Mode

X: Return to Main Menu

Enter Selection => /

Below this menu the current PMU mode Elan is in is displayed along with any options set using option A from the main menu. For modes where the CPU clock is running, the spinning activity cursor “\” will help show the speed of the CPU.

- A) Force PMU to Low Speed PLL Mode
 - The CPU clock will slow to the speed shown.
 - If set up to do so, the High Speed PLL will be shut off.
 - A keypress or toggling the ACIN pin will bring the system back to High Speed PLL Mode.
- B) Force PMU to Doze Mode
 - If the CPU clock speed is off, no spinning activity cursor will be displayed.
 - If the CPU clock is enabled for IRQ0 processing only then the spinning activity cursor will transition about once every 10 seconds.
 - If the CPU clock is enabled for IRQ0+64 Refresh cycles then the spinning activity cursor will be spinning.
 - If the Low Speed PLL (and Video PLL) are disabled in this mode, and an LCD is being used, the screen will go blank when this mode is entered.
 - A keypress or toggling the ACIN pin will bring the system back to High Speed PLL Mode.
- X) Force PMU to Sleep Mode
 - The keyboard is disabled in this mode. Pressing the SUS/RES key or toggling the ACIN pin will return the system to High Speed PLL Mode.
 - If using an LCD Screen, the user will be prompted to hit a key prior to entering sleep mode. This is because the LCD screen will go blank as the first step of the LVDD/LVEE power sequencing implemented.
- Δ) Force PMU to Suspend Mode
 - The keyboard is disabled in the mode. Pressing the SUS/RES key or toggling the ACIN pin will return the system to High Speed PLL Mode.
 - If using an LCD Screen, the user will not be allowed to force the system into this mode because the LCD Screen power sequencing of the LVDD/LVEE pins that normally occur as a result of transitioning from Sleep to Suspend, would be violated.

C: Test Battery Level & ACIN Pins

This menu item will show how the battery level and ACIN pins are tied to the PMU. Pin /BL1 can be used to force the CPU to run at 9.2Mhz. Pin /BL2 can be used to transition the PMU into Sleep Mode. Pin /BL4 can be used to transition the PMU into Suspend mode. Each of the above transitions can be enabled or disabled by selecting item A) "Change BL Transition Masks", highlighting the appropriate field and using the "+" and "-" keys to enable or disable the transitions. There is also an option to enable/disable a transition message. If enabled, a Transition message will be displayed as the Elan transitions from Low to Doze mode prompting the user to press a key before the system transitions to sleep or suspend.

The box on the top right of the screen displays the current state of the BLx and ACIN pins. Status for the BL4 pin is not directly readable by Elan. On the Elan Evaluation board, the state of the BL pins and ACIN pins are controlled by the RED 8 bank DIP switch. SW4. Switches 4-7 = BL1 - BL4, Switch 8 = ACIN.

ACIN must be set to 0 in order for any of the BL pins to cause a PMU state change. Once a BL pin is used to cause a PMU state change, setting ACIN to 1 (active) will wake the system up and return the PMU to High Speed PLL mode.

D: Test State Transition Timers & Suspend/Resume Key

This test is not yet written. Stay Tuned for Version 1.1

X: Restore PMU State and Exit to DOS

This option will restore Elan's Index registers to the value they were set to when the program was entered and return the user to the DOS prompt.

Z: Leave current PMU values and Exit to DOS

This option will leave Elan's Index registers set at their current value and return the user to the DOS prompt.

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